Horozov, T. S., *Physical Chemistry Chemical Physics,* 5, 2398-2409 (2003); Binks, B. P., Lumsdon, S. O., *Langmuir,* 16, 8622-8631 (2000); Aveyard, R., Clint, J. H., Nees, D., Quirke, N., *Langmuir,* 16, 8820-8828 (2000); Binks, B. P., Clint, J. H., Mackenzie, G., Simcock, C., Whitby, C. P., *Langmuir,* 21, 8161-8167 (2005); Bon, S. A. F., Mookhoek, S. D., Colver, P. J., Fischer, H. R, van der Zwaag, S., *European Polymer Journal,* 43, 4839-4842 (2007); Pieranski, P., Physical *Review Letters,* 45, 569-572 (1980); Subramaniam, A. B., Abkarian, M., Mahadevan, L., Stone, H. A., *Nature,* 438, 930-930 (2005); Subramaniam, A. B., Mejean, C., Abkarian, M., Stone, H. A., *Langmuir,* 22, 5986-5990 (2006); and Dinsmore, A. D., Hsu, M. F., Nikolaides, M. G., Marquez, M., Bausch, A. R., Weitz, D. A., *Science,* 298, 1006-1009 (2002)). Moreover, it is extremely difficult to detach particles from drop surfaces without providing energy from the surroundings. This is due to the fact that the Gibbs free energy barrier between the state of the particles located on the drop surface and the state of the particles away from the drop surface is much larger than in the case of surfactants in conventional emulsions. In summary, the final drops had non-spherical shapes because (i) the surface of the drops was overcrowded with particles, (ii) most particles were not able to escape from the drop surface due to the relatively high energy required to detach the particles from surfaces and (iii) the spherical shape (corresponding to a minimum surface) could not offer enough surface area for all the particles.

Finally, we would like to mention that we expect the technique to also work for Pickering emulsions in which nanoparticles are used as emulsion stabilizers, including emulsions containing much smaller drops. In this case, one needs to apply an electric field sufficiently strong to generate DEP forces capable of overcoming the other forces acting on the particles, including particle-particle interaction forces and Brownian forces (Kadaksham, A. T. J., Singh, P. and Aubry, N., *Electrophoresis,* 25, 3625-3632, (2004)). We have started to carry out preliminary experiments which indicate that this is indeed the case.

CONCLUSIONS

In this example, we have proposed and investigated a new technique to destabilize dielectric Pickering emulsions using external uniform electric fields. It is interesting to note that the method offers a unified way to manipulate emulsions from creation to destabilization, as emulsions can be created through the application of a uniform electric field in a microdevice (Ozen, O., Aubry, N., Papageorgiou, D. and Petropoulos, P. *Physical Review Letters,* 96, 144501 (2006)) by using the electrohydrodynamic instability present at a fluid-fluid interface (Ozen, O., Aubry, N., Papageorgiou, D. and Petropoulos, P., *Electrochimica Acta,* 51, 11425 (2006) and Li, F., Ozen, O., Aubry, N., Papageorgiou, D. and Petropoulos, P., *Journal of Fluid Mechanics,* 583, 347-377 (2007)). An overall advantage of such a method lies in the simplicity of its implementation, as it is relatively easy to apply electric fields.

Experiments were conducted using dielectric Pickering emulsions with micrometer-sized extendospheres. These emulsions consisted of water drops suspended in decane, and silicone oil drops suspended in corn oil. Experiments showed that Pickering emulsions could be destabilized under an AC electric field, resulting from the local particle density changes on the drop surface. For the first type of emulsions, or type I emulsions, for which the combined Clausius-Mossotti factor is positive, particles move to the poles of the drops. For the second type of emulsions, or type II emulsions, for which the Clausius-Mossotti factor is negative, particles move to the equator of the drops. Independently of the regions the particles move to, such motions open up some uncovered areas on the drops' surface through which adjacent drops merge. In certain drop arrangements, however, drops do not merge. These include drops for which the line joining their centers is parallel to the electric field in a type I emulsion as, in this case, particles aggregate at the poles of the drops, thus forming barriers at those locations and preventing the drops from merging. The situation is similar for drops for which the line joining their centers is normal to the electric field direction as, in this case, particles aggregate at the equator of the drops. However, when the relative location of adjacent drops is such that the line joining their centers forms a certain angle with respect to the electric field direction, merging takes place when a sufficiently large electric field is applied. After coalescence, the merged drops maintained non-spherical shapes.

We claim:

1. A method for destabilizing a particle-stabilized emulsion or a particle-stabilized foam in a composition comprising the particle-stabilized emulsion or foam comprising droplets of a liquid or gas dispersed in a continuous phase, the droplets having solid particles on their surfaces stabilizing the emulsion or foam, the method comprising applying an electric field to the emulsion or foam, thereby making the distribution of the solid particles on the droplets' surfaces non-uniform and making a portion of the surface of the droplets free of the solid particles, such that the droplets coalesce, producing coalesced droplets and a separated continuous phase.

2. The method of claim **1**, in which the electric field is uniform.

3. The method of claim **1**, in which the particle-stabilized emulsion or particle-stabilized foam is recycled.

4. The method of claim **1**, in which the droplets comprise a first particle-stabilized droplet and a second particle-stabilized droplet having a different composition than the first droplet, so that the electric field coalesces the first and second droplets.

5. The method of claim **4**, in which the first droplet and second droplet comprise reagents for a chemical or enzymatic reaction such that the reaction proceeds when the first and second droplets coalesce.

6. The method of claim **4**, wherein the first droplet comprises an enzyme and the second droplet comprises a substrate for the enzyme.

7. The method of claim **4**, wherein the first and second droplets are coalesced in a microfluidics system comprising electrodes adapted to apply the uniform electric field to the droplets in the continuous phase.

8. The method of claim **4**, in which the first particle-stabilized droplet and a second particle-stabilized droplet are of different sizes.

9. The method of claim **1**, in which the emulsion or foam or a constituent of the emulsion or foam is a waste product.

10. The method of claim **1**, in which the emulsion or foam is produced by a manufacturing process.

11. The method of claim **1**, further comprising, performing a manufacturing process to produce separated continuous phases from the emulsion or foam.

12. The method of claim **1**, further comprising using one or both of the coalesced droplets or the separated continuous phase in a manufacturing process.

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